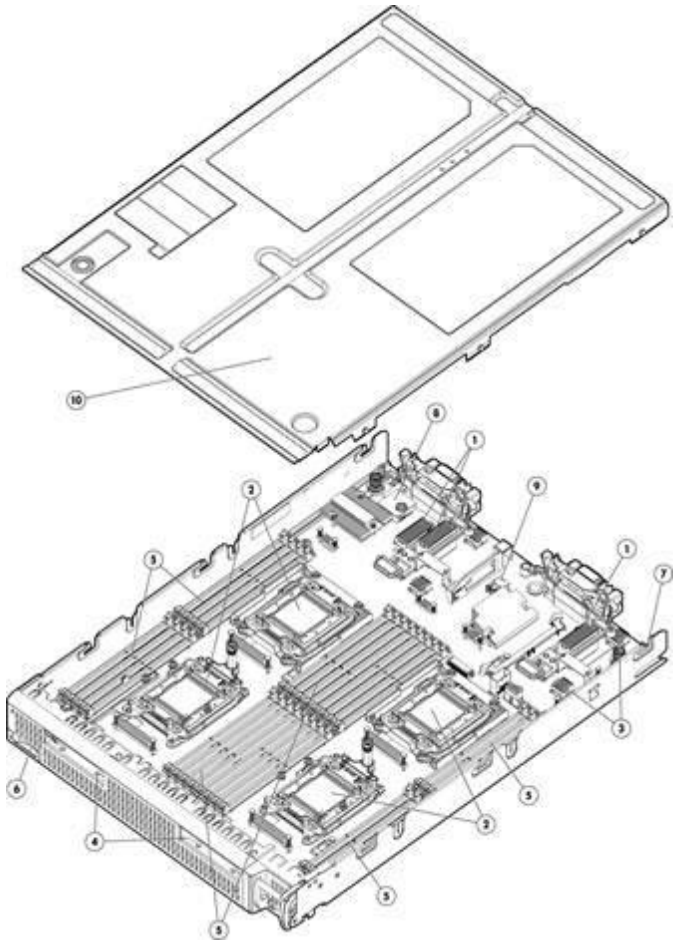
Overview

HP ProLiant BL660c Gen8 Server Blade



HP ProLiant BL660c Gen8 Server Blade

1. Three (3) PCIe 3.0 mezzanine I/O expansion slots
2. Up to four (4) Intel® Xeon® E5-4600 and E5-4600v2 families of processors
3. Two FlexibleLOM connectors
4. Two (2) small form factor (SFF) hot-plug drive bays
5. Thirty-two (32) DDR3 DIMM memory slots (8 per processor)
6. HP c-Class Blade SUV (Serial, USB, VGA) connector
7. MicroSDHC card connector
8. Trusted Platform Module (TPM) connector
9. Internal USB 2.0 connector
10. Access panel

What's New

- Support for the Intel® Xeon® processor E5-4600v2 product family
- Support for DDR3-1600 1.35V memory.
- Support for DDR3-1866 1.5V memory.
- Support for 12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance and Enterprise Mainstream Solid State Drives

Standard Features

NOTE: This document covers the HP ProLiant BL660c Gen8 server blade only. For information on HP BladeSystems c-Class Enclosures and HP BladeSystem c-Class interconnect and mezzanine options, please see the following:

HP BladeSystem c-Class Enclosures QuickSpecs:

- HP BladeSystem c3000 Enclosure QuickSpecs at
  http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html
  NOTE: The c3000 HP c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
  NOTE: The ProLiant BL660c Gen8 requires the c3000 Enclosure to be configured with 6 fans.
- HP BladeSystem c7000 Enclosure QuickSpecs at
  http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.html
  NOTE: The c7000 HP c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
  NOTE: The ProLiant BL660c Gen8 requires the c7000 Enclosure to be configured with 10 fans.
- HP BladeSystem c-Class interconnect and mezzanine options at
  http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html
  http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html

NOTE: For proper BladeSystem operation, the minimum required versions of HP Onboard Administrator and HP Virtual Connect are required and available via the HP Service Pack for ProLiant, please see http://www.hp.com/go/spp/download.

Processor One of the following depending on Model	**E5-4600 v2 series Processors** HP BL660c Gen8 E5-4657Lv2 (2.4GHz/12-core/30MB/115W) Processor HP BL660c Gen8 E5-4650v2 (2.4GHz/10-core/25MB/95W) Processor HP BL660c Gen8 E5-4640v2 (2.2GHz/10-core/20MB/95W) Processor HP BL660c Gen8 E5-4627v2 (3.3GHz/8-core/16MB/130W) Processor HP BL660c Gen8 E5-4620v2 (2.6GHz/8-core/20MB/95W) Processor HP BL660c Gen8 E5-4610v2 (2.3GHz/8-core/16MB/95W) Processor HP BL660c Gen8 E5-4607v2 (2.6GHz/6-core/15MB/95W) Processor HP BL660c Gen8 E5-4603v2 (2.2GHz/4-core/10MB/95W) Processor **E5-4600 series Processors** Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) Processor Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) Processor Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) Processor Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) Processor Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) Processor Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) Processor Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) Processor Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) Processor
Cache Memory One of the following depending on Model	30MB Level 3 **NOTE:** E5-4657L v2 processor 25MB Level 3 **NOTE:** E5-4650 v2 processor 20MB Level 3 **NOTE:** E5-4650, E5-4650L, E5-4640, E5-4640 v2, E5-4620 v2 processors

Standard Features

	16MB Level 3 **NOTE:** E5-4620, E5-4627 v2, E5-4610 v2 processors 15MB Level 3 **NOTE:** E5-4617, E5-4610, E5-4607 v2 processors 12MB Level 3 **NOTE:** E5-4607 processor 10MB Level 3 **NOTE:** E5-4603, E5-4603 v2 processors **NOTE:** All processor models above list the L3 Cache associated with that particular processor.
Chipset	Intel® C600 Series Chipset **NOTE:** For more information regarding Intel chipsets, please see the following: http://www.intel.com/products/server/chipsets/.
Upgradeability	Upgradeable to four (4) processors. **NOTE:** Processor upgrade available from Intel® Xeon® Processors E5-4600 to E5-4600 v2. Please contact HP Technology Sales (http://www.hp.com/support), your local HP Re-seller, or reference the following Customer Advisory: ProLiant Servers-Instructions for Upgrading an HP ProLiant Gen8 Server from an Intel Xeon Processor E5-4600 to an Intel Xeon Processor E5-4600 v2, regarding critical details before upgrading. An explanation of requirements and limitations are provided.
On System Management Chipset	HP iLO (Firmware: HP iLO 4) **NOTE:** For more information, visit: http://www.hp.com/go/ilo
Memory Protection	Data bus ECC protection Advanced ECC / SDDC Rank sparring (on line spare) Lockstep mode DIMM address/control bus parity protection Failed DIMM isolation Demand scrubbing Patrol scrubbing Memory thermal control Memory mirroring inter-socket
Memory One of the following depending on Model	Type: HP SmartMemory DDR3 Load Reduced (LRDIMM) and Registered (RDIMM) Maximum (LRDIMM): 1.0TB (32 x 32GB) up to 1866MHz at 1.5V Maximum (RDIMM): 512GB (32 x 16GB) up to 1600MHz at 1.35V 768GB (32 x 24GB) up to 1333MHz at 1.35V **NOTE:** HP memory from previous generation servers are not qualified or warranted with this server. **NOTE:** HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html **NOTE:** LRDIMMs and RDIMMs are distinct memory technologies and cannot be mixed within a server. **NOTE:** Depending on the memory configuration and processor model, the memory speed may run at 1866MHz, 1600MHz, 1333MHz, or 1066MHz. Please see Memory Population Table later in this document or the Online Memory Configuration Tool at: www.hp.com/go/ddr3memory-configurator. **NOTE:** For additional memory rules and guidelines, see the "Memory" section later in this document.

Standard Features

Network Controller

Two (2) HP FlexibleLOM connectors for one or two dual-port FlexibleLOMs
NOTE: FlexibleLOM options include 10Gb FlexFabric, 10Gb Flex-10, and 10Gb Ethernet.
NOTE: FlexFabric capabilities require the use of an HP Virtual Connect FlexFabric module. Learn more at: http://www.hp.com/go/bladesystem/interconnects
NOTE: The server supports one or two FlexibleLOMs.
NOTE: For Pre-configured Model configurations, two FlexibleLOMs are already included; no additional FLexibeLOMs are added.
NOTE: For a Factory Integrated Model configuration with one FlexibleLOM, it is added in the HP Networking section of "Step 2" in the Factory Integrated Models section.
NOTE: For a Factory Integrated Model configuration with two FlexibleLOMs, the second FlexibleLOM is a different part number. You must select the first FlexibleLOM in the "Step 2" HP Networking section and select the second FlexibleLOM in the "Step 4" HP Networking section.
NOTE: All FlexibleLOMs are dual port: one port is routed to interconnect module bay 1 and the other to bay 2.

Expansion Slots

Three (3) I/O expansion mezzanine slots:

- x8 PCIe 3.0 Type A (supports Type A mezzanine cards) (expansion slot 1).
- x16 PCIe 3.0 Type B (supports Type A and Type B mezzanine cards (expansion slot 2).
- x16 PCIe 3.0 Type B (supports Type A and Type B mezzanine cards (expansion slot 3).

Mezzanine card options include:

- Dual-port to quad-port (depending on the model) 10Gb FlexFabric, 10Gb Flex-10, 10Gb Ethernet, and 1Gb Ethernet for additional Ethernet network ports.
- Dual-port 20Gb Flex Fabric for additional Ethernet network ports.
- Dual-port 8Gb and 16GB Fibre Channel HBAs for SAN connectivity.
- QDR and FDR InfiniBand for low latency and high bandwidth server interconnectivity.
- HP Smart Array P721m Controller for direct attached SAS Storage
- HP I/O Accelerator Options for higher I/O performance and low latency access to storage, with the reliability of solid state

HP Server ROM

HP ROM (read only memory) is now digitally signed using HP's Corporate Signing Service. This signature is verified before the flash process starts, reducing accidental programming and preventing malicious efforts to corrupt system ROM.

HP ROM provides for essential initialization and validation of hardware components before control is passed to the customer-installed operating system. The ROM also provides the capability of booting from various fixed media (HDD, CD-ROM) and removable media (USB), to continue operation to the operating system.

HP ROM performs very early configuration of the video controller, to allow monitoring of initialization progress via an attached monitor. If configuration or hardware errors are discovered during this early phase of hardware initialization, suitable messages are now displayed on the connected monitor. Additionally, these configuration or hardware errors are logged to the Integrated Management Log (IML) to assist in diagnosis.

HP's ProLiant ROM is used to configure the following:

- Processor and chipset status registers
- System memory, memory map, and memory initialization
- System hardware configuration (integrated PCI devices and optional PCIe cards).
- Customer-specific BIOS configuration using the HP ROM-Based Setup Utility (RBSU).

Standard Features

NOTE: For further information, please refer to HP's RBSU (ROM based setup utility) user guide at www.hp.com/support/rbsu.

Storage Controller	All Models	One (1) embedded HP Smart Array P220i Controller **NOTE:** The HP Smart Array P220i supports RAID 0 and 1. It includes 512MB flash-backed write cache (FBWC) on pre-configured models and is optional on factory integrated models. The FBWC is not required for RAID capability. The purpose of the cache is it can increase hard drive write performance and provides data protection in case the server losses power. **NOTE:** The HP Smart Array P220i supports upgradeable firmware with recovery ROM. **NOTE:** The HP Smart Array P220i supports two (2) small form factor (SFF) hot plug drive bays. Available Options: Smart Array Advanced Pack 2.0 Software for enhanced performance, reliability, availability, and security of system data

Maximum Internal Storage	Hot Plug SFF SAS	2.4TB	2 x 1.2TB
	Hot Plug SFF SATA	2.0TB	2 x 1.0TB
	Hot Plug SFF SAS SSD	1.6TB	2 x 800GB

NOTE: The ProLiant BL660c Gen8 server includes the new HP hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HP drives from previous generation servers are not compatible with the ProLiant BL660c Gen8 drive bays.
NOTE: The mixing of standard SAS drives with SAS SSD drives is supported within the server, but limits the RAID configuration to two separate RAID 0 volumes. Mixing of other drives types is not supported.

Interfaces	Micro SDHC Slot	One (1) internal Micro Secure Digital High Capacity (Micro SDHC) card slot
	USB 2.0 Port	One (1) internal USB 2.0 connector for USB flash media drive keys

NOTE: The above options are for integrated hypervisor virtualization environments needing a low cost boot solution with the highest performance and reliability.

Industry Standard Compliance

ACPI 2.0
Microsoft® Logo certifications
USB 2.0 Support
IMPI 2.0
Secure Digital 2.0
TMP 1.2 Support
IEEE (specific IEEE standards depending on Ethernet adapter card(s) installed)
Advanced Encryption Standard (AES)
Triple Data Encryption Standard (3DES)
SNMP
SSL 2.0
DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP)
Active Directory v1.0
PCIe 3.0
SR-IOV capability (requires network adapter and operating system support)

Operating Systems and Microsoft Windows Server

Standard Features

Virtualization Software Support for ProLiant Servers	Red Hat Enterprise Linux (RHEL) SUSE Linux Enterprise Server (SLES) Oracle Solaris VMware Citrix XenServer **NOTE:** For more information on HP's Certified and Supported ProLiant Servers for OS and Virtualization Software and latest listing of software drivers available for your server, please visit our Support Matrix at: http://www.hp.com/go/ossupport and our driver download page http://www.hp.com/support/BL660cGen8.
Enclosures	Enclosures HP offers two different c-Class server blade enclosures to meet your individual needs: • The HP BladeSystem c7000 rack enclosure is 10U high and holds up to eight (8) ProLiant BL660c Gen8 servers plugged vertically. • The HP BladeSystem c3000 rack enclosure is 6U high and holds up to four (4) HP ProLiant BL660c Gen8 servers plugged horizontally. • Server blades, storage blades, interconnect modules, power supplies, fans, and redundant Onboard Administrator modules are all designed to fit into the c3000 and c7000 enclosures. **NOTE:** For additional enclosure information, please see http://h18004.www1.hp.com/products/blades/components/enclosures/c-class/index.html.
Graphics	Integrated Matrox G200 video standard • 1280 x 1024 (32 bpp) • 1920 x 1200 (16 bpp) HP iLO 4 On System Management Memory • 16 MB Flash • 256 MB DDR 3 with ECC (112 MB after ECC and video)
Form Factor	HP ProLiant BL660c Gen8 is a single-wide, full-height server blade that plugs into the HP BladeSystem c3000 and c7000 enclosures.
On System Management	HP iLO Management Engine HP iLO Management Engine is a comprehensive set of embedded management features supporting the complete lifecycle of the server, from initial deployment, through ongoing management, to service alerting and remote support. HP iLO Management Engine comes standard on all HP ProLiant Gen8 servers. The HP iLO Management Engine portfolio includes: • **HP iLO:** The HP iLO (Integrated Lights-Out) management processor is the core foundation for the HP iLO Management Engine • **HP Agentless Management:** Provides built in server health monitoring and alerting capability without OS agents, that starts working the moment a power cord and an Ethernet cable are connected. • **HP Active Health System:** Always on, continuous monitoring for increased stability and shorter downtimes; 100% configuration history; Health and service alerts and easy export and upload to Service and Support. • **HP Intelligent Provisioning:** Lets customers provision and configure a single server without any separate media. No more SmartStart CDs or firmware DVDs are needed. ○ To start Intelligent Provisioning: ▪ Press the F10 key during the ProLiant Gen8 server boot process (also known as power on self test or POST).

- Please go to the Intelligent Provisioning website at www.hp.com/go/intelligentprovisioning for additional information and to view usage videos.
- Use the Service Pack for ProLiant (SPP) at www.hp.com/go/spp to get firmware and software updates.

- **HP iLO Mobile App:** Enables the ability to access, deploy, and manage your server anytime from anywhere from select smartphones and mobile devices. For additional information please visit: www.hp.com/go/ilo/mobileapp

NOTE: For more information, visit: http://www.hp.com/go/ilo or HP iLO Management Engine technologies whitepaper

HP Insight management software	HP Service Pack for ProLiant (SPP)	HP Service Pack for ProLiant (SPP) and HP Smart Update Manager (HP SUM) provide a comprehensive approach to firmware and system software maintenance. Together they provide better operating stability and ensure maximum uptime. The SPP will be updated at a predictable cadence, typically coinciding with new HP server hardware launches. By enabling firmware to be updated online and integrating firmware and system software updates in one operation, HP SUM and the SPP offer faster updates of individual servers and dramatically faster updates of entire BladeSystem enclosures. Further improving system uptime and stability is the fact that HP provides 12 months of support for each Service Pack for ProLiant release. The user experience around HP SUM and the SPP has been improved in several ways, starting with the web download. A single web page provides access to a single download containing both the latest version of HP SUM and the latest SPP. Optional smaller subsets with only specific types of servers or specific operating systems are offered to save on download time. The HP SUM application provides a straightforward, intuitive user interface that guides the user through the steps of discovery, analyses and update, providing comprehensive information on available updates, criticality and interdependencies. This information is also available in reports. By providing the option of multiple local or shared repositories which can be easily updated from hp.com, HP SUM provides the tools to optimize stability and consistency throughout the company. While HP SUM and the SPP recommend the combinations of firmware and system software that HP has found to be the best practice, the application gives customers the flexibility to set their own specific baseline. The Service Pack for ProLiant has been rigorously tested with specific attention for interaction between firmware, drivers and agents both within the server as well as in interaction with the BladeSystem enclosure components (Onboard Administrator and Virtual Connect). This testing ensures the highest quality as well as providing the input for HP SUM to deploy updates taking into account all interdependencies, when determining the correct updates and order of update deployment. **NOTE:** The Service Pack for ProLiant (which includes HP SUM) can be downloaded from www.hp.com/go/spp/download. More information can

Standard Features

be found: http://www.hp.com/go/SmartUpdate, www.hp.com/go/spp and http://www.hp.com/go/hpsum

Security

- Power-on password
- Administrator's password
- Keyboard password (QuickLock)
- HP iLO 4 On System Management Chipset with:
  - SSL encryption
  - Secure Shell version 2
  - Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser, CLP and XML scripting interface
  - AES and RC4 encryption of video
- External USB port enable/disable
- Network server mode
- Serial interface control
- TPM (Trusted Platform Module) 1.2 option
- Advanced Encryption Standard (AES)
- Intel® Advanced Encryption Standard-New Instructions (AES-NI)
- Intet TXT (require the TPM module option)

Availability

Memory

- Data Bus ECC protection provides automatic correction from a single data bit error and detection of double data error bits. Often called single error correction/double error detection (SEC/DED).
- Advanced ECC uses single device data correction (SDDC) to detect and correct single and all multi-bit error that occurs within a single DRAM chip. Both x4 and x8 SDDC are supported (x8 requires lockstep mode).
- Memory online spare mode (also known as rank spare mode) detects a rank that is degrading and switches operation to the spare rank. HP offers the rank sparing rather than DIMM sparing as rank sparing uses less spare memory resulting in reduced overhead.
- Memory lockstep mode is used to correct a single x8 DRAM device failure on a DIMM. The DIMMs in each paired memory channel must have identical HP part numbers.
- Memory demand and patrol scrubbing prevent accumulation of correctable errors and reducing the likelihood of unplanned downtime.
- Failed DIMM isolation improves the service time thus improving the overall system availability.
- Address parity protection available on RDIMMs and LRDIMMs detects address bit errors to improve service time and overall system availability.
- Memory thermal control is used to prevent DIMMs from overheating. Achieved by slowing down the memory access rate per the temperature monitored by DIMM sensor.
- Memory mirroring inter-socket stores a copy of memory with dynamic failover in case of failure. Once a DIMM in a mirrored set is detected as failed, the mirror failover uses its mirrored DIMM.

Mezzanine options and I/O

- One or two FlexibleLOM connectors each supporting two (i.e. redundant) Ethernet ports routed to redundant interconnect modules.
- Multiple mezzanine I/O expansion slots that support a wide variety of mezzanine cards each supporting multiple data paths routed to redundant interconnect modules.
- Network Adapter Teaming (bonding) provides network fault tolerance, transmit load balancing, and switch-assisted load balancing.

Standard Features

Storage

- Two (2) hot-plug SAS/SATA/SSD drive bays.
- Integrated HP Smart Array P220i Controller with 512MB FBWC capability, RAID 0 and 1, and upgradeable firmware with recovery ROM capability.
  NOTE: The 512MB flash-backed write cache (FBWC) is included on pre-configured models and is optional on factory integrated models. The FBWC is not required for RAID capability. The purpose of the cache is it can increase hard drive write performance and provides data protection in case the server loses power.
- Up to eight optional HP D2200sb and/or D2202Osb Storage Blades for attachment of up to 12 drives per Storage Blade (up to 96 drives total) within the c-Class enclosure.
- Optional dual-port Fibre Channel mezzanine card(s) for redundant SAN connections.

Processor/Chipset

- Processor internal sensors & thermal control protection against over-temperature conditions.
- Cache parity/ECC protects cache data from accidental data corruption.
- Machine Check Architecture (MCA) detects and captures hardware errors such as system bus, memory ECC, parity, and cache, and improves service time.
- Intel® QPI Protocol Protection allows detection of data errors using a checksum of 8-bits.
- Core Disable for FRB (fault resilient boot) allows a system to power-on despite a failing core-pair. It uses BIST (built-in self test) results to detect a failure and disables the target core-pair upon subsequent boot.

Server Blade Enclosure Infrastructure

- Pooled power for true N+N power redundancy through up to six (6) hot-plug, high-efficiency, common slot enclosure-based power supplies (configuration dependent).
- Up to ten (10) redundant enclosure-based hot-plug HP Active Cool fans that scale to meet future demands and optimize airflow, reduce power draw, and improve acoustic performance.
- Dual grid power providing redundant rack enclosure power feeds to the server blade enclosure.
- HP Dynamic Power Saver Mode the total enclosure power consumption is monitored in real time and automatically adjusted with changes in demand for improved efficiency and reliability.
- HP Dynamic Power Capping safely limits power usage without impacting performance by capping peak usage instead of average power usage, removes risk to electrical infrastructure with a fast-acting, hardware-based capping algorithm, and reclaims more power by dynamically controlling power limits based on workload demand.
- Up to eight interconnect modules per server blade enclosure providing four simultaneous redundant fabrics for FlexFabric, Virtual Connect Ethernet, Fibre Channel, InfiniBand, Pass Thru Ethernet, etc.
- Enclosure crosslinks between adjacent enclosures to provide interconnect module-to-module connections or as Virtual Connect module stacking links.
- Optional enclosure redundant Onboard Administrator system management module.

Warranty

This product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HP Care Pack services or customized service agreements. Certain restrictions and exclusions apply. Hard drives have either a one year or three year warranty; refer to specific hard drive QuickSpecs for details.

Standard Features

NOTE: Server warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have HP replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html.

Optional Features

Fibre Channel Support		Up to three (3) optional Fibre Channel mezzanine HBAs are supported on the HP ProLiant BL660c Gen8.
Compatible SAN		HP ProLiant BL660c Gen8 server blades are optimized for HP MSA, EVA and XP. HP ProLiant BL660c Gen8 server blades are compatible with select 3rd party SANs. Please see blade storage page for more details at http://h18004.www1.hp.com/products/blades/components/c-class-sans.html.
HP Virtual Connect		HP Virtual Connect is an interconnect option for BladeSystem c-Class that simplifies server connectivity to data and storage networks, and reduces costs. Unique HP Flex-10 technology makes maximum use of network bandwidths, provide dynamic tuning and enable extreme flexibility to meet individual server and infrastructure requirements by allocating up to 4 network connections per server port. Virtual Connect FlexFabric modules extend those capabilities to allocate one function per port to storage connections. HP Virtual Connect Enterprise Manager (VCEM) provides server management software with a central console to administer network connections and workloads for thousands of servers. For more information on Virtual Connect Enterprise Manager, see http://www.hp.com/go/vcem. For more information on Virtual Connect Ethernet, Fibre Channel, Converged Network and management options, see http://www.hp.com/go/virtualconnect.
HP Insight management software	HP Insight Control	HP Insight Control, a product option, delivers essential infrastructure management that can help save time and money by making it easy to deploy, migrate, monitor, remote control, and optimize your IT infrastructure through a single, simple management console. For more information, see http://www.hp.com/go/insightcontrol. HP Insight Control includes one year of 24 x 7 HP Software Technical Support and Update Service ensuring rapid access to HP support staff and proactive delivery of software updates. For more information about this service, see http://www.hp.com/services/insight.
	HP Matrix Operating Environment	The HP Matrix Operating Environment (Matrix OE) for ProLiant and Integrity servers is an integrated command center that helps you instantly adjust to dynamic business demands. This advanced infrastructure management software lets you reduce the cost of common data center tasks by up to 40 percent while keeping pace with your changing business. The HP Matrix OE includes the automated provisioning, optimization, and recovery management capabilities for HP CloudSystem Matrix, the ideal platform for private cloud and Infrastructure as a Service (IaaS). For more information, see http://www.hp.com/go/matrixoe.
	HP iLO Scale-Out	The HP iLO Scale-Out license ideal for web/hosting/cloud service providers and High Performance Computing environments. This license is a specific subset of iLO Advanced functionality, provides fast remote access through Text Console via SSH, lower operational cost with Dynamic power capping, and faster time to resolution through Email-based Alerting and proactive notifications. With this newly designed HP iLO Scale-Out license HPC customers now have a server management package solely design and priced for their massive data environments. HP iLO Scale-Out is available on all HP ProLiant Gen8 BL and SL platforms. For more information, see: www.hp.com/go/iLO/scale-out
	HP iLO Advanced	HP Integrated Lights-Out Advanced License a product option, providing smart remote server management without compromise. iLO Advanced

Optional Features

		unlocks the full set of remote administration functionality for all HP ProLiant servers by activating the full Virtual Keyboard Video and Mouse remote console, multi-user collaboration, console record and replay, GUI-based and scripted virtual media and virtual folders, and enhanced security and power management functionality. For more information, see: http://www.hp.com/go/iloadvance
HP OneView		The HP OneView architecture combines server, storage, and networking with control of datacenter environmentals into a single, integrated management platform. Architected to deliver lifecycle management for the complete Converged Infrastructure, it facilitates collaboration, removes friction, collapses cycle times, eliminates error-prone work, and accelerates time to value. HP OneView v1.0 combines management of servers and virtual connect with open integration to automate and customize existing tools and processes. With OneView, you'll work smarter-with greater visibility and control-and fully capitalize on the benefits of a Converged Infrastructure. For more information on HP OneView management, see: http://www.hp.com/go/oneview
High Performance Clusters	HP Cluster Platforms	HP Cluster Platforms are specifically engineered, factory-integrated large-scale ProLiant clusters optimized for High Performance Computing, with a choice of servers, networks and software. Operating system options include specially priced offerings for Red Hat Enterprise Linux and SUSE Linux Enterprise Server, as well as Microsoft Windows HPC Server. A Cluster Platform Configurator simplifies ordering. http://www.hp.com/go/clusters
	HP HPC Interconnects	HP HPC Interconnects High Performance Computing (HPC) interconnect technologies are available for this server as part of the HP Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by HP when integrated within an HP cluster. Flexible, validated solutions can be defined with the help of configuration tools. http://www.hp.com/techservers/clusters/ucp/index.html
	HP Insight Cluster Management Utility	HP Insight Cluster Management Utility (CMU) is an HP-licensed and HP-supported suite of tools that are used for lifecycle management of hyperscale clusters of Linux ProLiant systems. CMU includes software for the centralized provisioning, management and monitoring of nodes. CMU makes the administration of clusters user friendly, efficient, and effective. http://www.hp.com/go/cmu
Storage Software		Whether you need to solve a specific data protection, archiving, or storage command and control challenge, or deliver on strategic consolidation, compliance, or continuity initiatives, look no further than HP storage software. Our storage software helps you reduce costs, simplify storage infrastructure, protect vital assets and respond faster to business opportunities. Storage software that gets the job done: • Data Protection and Recovery Software Whether you're a large enterprise or a smaller business, HP data protection and recovery software will cost-effectively protect you against disaster and ensure business continuity. • Data Archive and Migration Software HP's storage software enables you to comply with data retention and retrieval requirements, improve application performance, and reduce costs by efficiently migrating infrequently accessed or less valuable data to lower cost storage. • Storage Resource Management Software (SRM) HP's storage resource management software reduces operational costs and provides the

Optional Features

command and control foundation you need to efficiently manage and visualize your physical and virtual environments.

- Data Replication Software
  HP offers array-based and host-based replication software for use in disaster recovery, testing, application development and reporting.
- Storage Device Management Software
  Maximize your investment in HP storage and networking with software that enables hardware-specific configuration, performance tuning and connectivity management.
- HP StoreVirtual VSA
  With HP StoreVirtual VSA you can use the power of virtualization to turn a set of heterogeneous and disconnected physical disk drives in your servers and storage devices into a single pool of logical storage capacity.

NOTE: For more information available Storage Software including QuickSpecs, please see: www.hp.com/go/storage/software.

HP Proactive Insight experience	Prevent problems with innovative, automated monitoring tools and proactive services. The HP Proactive Insight experience consist of using Insight Online, Insight Remote Support, and Proactive Care Support Service as one integrated solution. The Proactive Insight experience provides you with expert advice and personalized, cloud-based automated IT support, helping to prevent unplanned down time and solve problems quickly. For more information, visit: www.hp.com/go/proactiveinsightexperience
Factory Express Portfolio for Servers and Storage	HP Factory Express offers configuration, customization, integration and deployment services for HP servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed. Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. HP products supported through Factory Express include a wide array of servers and storage: HP Integrity, HP ProLiant, HP ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSAxxxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches. For more information on Factory Express services on your specific server model please contact your sales representative or go to: http://www.hp.com/go/factory-express.html
HP Simple Configurator	SCE is a guided self service tool to help sales and non technical people provide customers with initial configurations in 3 to 5 minutes. You may then send the configuration on for configuration help, or use in your existing ordering processes. If you require "custom" rack configuration or configuration for products not available in SCE, please contact HP's Customer Business Center or an Authorized Partner for assistance. http://www.hp.com/products/configurator

Service and Support

Service and Support

HP Technology Services for Industry Standard Servers

HP Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Connect to HP to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Protect your business beyond warranty with HP Care Pack Services
HP Care Pack Services enable you to order the right service level, length of coverage and response time as you purchase your new server, giving you full entitlement for the term you select.

Recommended HP Care Pack Services for your HP product

Optimized Care

HP Proactive Care Advanced - 24x7 coverage, three year Care Pack Service

Achieve a higher return on your product investment with the personal attention from a locally assigned Account Support Manager who delivers recommendations designed to improve availability and performance. Leverage your system's ability to connect to HP for automated problem detection and rapid critical event management to increase stability and reduce unplanned downtime. This recommendation provides 24x7 coverage with four-hour response for hardware and two-hour callback for supported software. Collaborative call management comes with Proactive Care Advanced or you may choose full support from HP where we own all cases through to resolution. HP is a leading provider of support services for most operating systems used on HP BladeSystem with long, successful partnerships with vendors such as Microsoft, Red Hat, VMware, SUSE and others. Purchasing software support from HP simplifies troubleshooting and shortens time to resolution with one call for hardware or software questions.
http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA5-3259ENW&cc=us&lc=en

Standard Care

HP Proactive Care with 24x7 coverage, three year Care Pack Service
HP Proactive Care helps prevent problems and stabilize IT by utilizing secure, real-time, predictive analytics and proactive consultations when your products are connected to HP. This Care Pack Service combines three years' proactive reporting and advice with our 24x7 coverage and enhanced escalation management, four hour hardware response time and two hour call back for software questions on leading industry standard software running on your HP ProLiant server.
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855ENW.pdf

Related Services

HP ProLiant Server Hardware Installation
Provides for the basic hardware installation of HP branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner.
http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-9356EN.pdf

Factory Express for Servers and storage
HP Factory Express offers configuration, customization, integration and deployment services for HP servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed. For more information on Factory Express services for your specific server model please contact your sales representative or go to: http://www.hp.com/go/factory-express.

Data Privacy Services
Protect your data through better media management. HP Data privacy services help manage and protect sensitive data to reduce the risk of unauthorized access to private information and help meet compliance requirements. Our retention services allow you to keep drives and other devices upon

Service and Support

failure, our removal services provide convenient data sanitization and our recovery services allow you to safely retire IT assets and capture any remaining value from the hardware.
www.hp.com/services/dataprivacy

Additional HP Care Pack services can be found at: http://www.hp.com/go/cpc

Get connected to HP to improve your support experience	Connecting products to HP will help prevent problems with 24x7monitoring, prefailure alerts, automatic call logging, and parts dispatch, plus current data will be available for the proactive reports that are part of Proactive Care Services. With Connected products, you can have a dashboard to manage your IT anywhere, anytime, from any device.
HP Support Center	Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more http://www.hp.com/go/hpsc HP's Support Center Mobile App allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime. HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement. **NOTE:** HP Support Center Mobile App is subject to local availability.
Parts and Materials	HP will provide HP-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements. Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services. The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction.
For more information	To learn more on HP ProLiant servers and HP BladeSystem servers, please contact your HP sales representative or HP Authorized ServiceOne Channel Partner. Or visit: www.hp.com/services/bladesystem

Pre-configured Models

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.
NOTE: Pre-configured models ship with the configurations below. Options can be selected from the Core or Additional options section of this QuickSpecs.
NOTE: HP does not allow factory integration of options into pre-configured models. Any additional options purchased will be shipped separately.
NOTE: If you desire a custom configuration please see "Configuration Information - Factory Integrated Models" section of this QuickSpecs.
NOTE: Not all Pre-configured Models are available in all regions. Check with your local country HP offices for availability.

E5-4600v2 series Processors

Performance Models

HP ProLiant BL660c Gen8 E5-4650v2 4P 128GB-R Server 727959-B21	**Processor(s)**	Four (4) Intel® Xeon® E5-4650v2 (2.4GHz/10-core/25MB/95W)
	Cache Memory	25MB Level 3 cache
	Memory	128GB (8x 16GB) PC3L-14900R (DDR3-1866) Registered DIMMs at 1.5V **NOTE:** Server supports a total of 32 DIMM slots.
	Network Controller	Two (2) HP FlexFabric 10Gb 2-port 534FLB FlexibleLOMs
	Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
	Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
	Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
	Optical Drive Bay	None
	Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.
	Management	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control
	Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
	Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

Base Model

HP ProLiant BL660c Gen8 E5-4620v2 4P 128GB-R Server 727958-B21	**Processor(s)**	Four (4) Intel® Xeon® E5-4620v2 (2.6GHz/8-core/20MB/95W)
	Cache Memory	20MB Level 3 cache
	Memory	128GB (8x 16GB) PC3L-12800R (DDR3-1600) Registered DIMMs at 1.35V **NOTE:** Server supports a total of 32 DIMM slots.
	Network Controller	Two (2) HP FlexFabric 10Gb 2-port 534FLB FlexibleLOMs
	Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
	Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
	Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
	Optical Drive Bay	None
	Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.

Pre-configured Models

	Management	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control
	Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
	Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

Entry Model

HP ProLiant BL660c Gen8 E5-4607v2 2P 64GB-R Server 727957-B21	**Processor(s)**	Two (2) Intel® Xeon® E5-4607v2 (2.6GHz/6-core/15MB/95W)
	Cache Memory	15MB Level 3 cache
	Memory	64GB (4x 16GB) PC3L-12800R (DDR3-1600) Registered DIMMs at 1.35V **NOTE:** Server supports a total of 32 DIMM slots.
	Network Controller	Two (2) HP FlexFabric 10Gb 2-port 534FLB FlexibleLOMs
	Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
	Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
	Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
	Optical Drive Bay	None
	Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.
	Management	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control
	Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
	Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

Configuration Information - Factory Integrated Models

NOTE: This section lists some of the steps required to configure a Factory Integrated Model or configure-to-order (CTO) server. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for information on CTO product offerings and requirements.
NOTE: Configure-to-order server blades must start with a CTO Blade Server
NOTE: FIO indicates that this option is only available as a factory installable option.
NOTE: All CTO (Configure to Order) systems will be populated with sufficient hard drive blanks based on the number of initial hard drives ordered with the server.

Step 1: Base Server Blade Configuration (Select a configurable Blade)

Models	HP ProLiant BL660c Gen8 10Gb/20Gb FlexibleLOM Configure-to-order Blade Server	679118-B21
	Each configurable model ships with:	
	Two (2) FlexibleLOM connectors providing a choice of supported FlexibleLOMs (see Step 2) One (1) embedded HP Smart Array P220i Controller with RAID 0, 1 Optional HP Smart Array P220i Controller 512MB FBWC (listed in step 4) Two (2) HP small form factor hot-plug SAS/SATA/SSD hard drive bays Three (3) PCIe Gen 3.0 I/O expansion slots (one x8 Type A, two x16 Type B) One (1) integrated USB connector and one (1) MicroSDHC connector One (1) TPM connector HP iLO Management Engine (standard)	

Step 2: Choose Required Options (one of the following from each list unless otherwise noted)

HP Processors	**NOTE:** The BL660c Gen8 supports two or four processors; one and three processor configurations are not supported. **NOTE:** All processor kits contain two (2) processors. **NOTE:** If four processors are desired, select one 2P xxxxxx-L21 processor kit here in Step 2 and one xxxxxx-B21 2P processor kit in Step 3. **NOTE:** All processors within the server must be identical. **NOTE:** The processor model as well as the memory configuration determines the maximum speed memory can operate. Please see the see the "Memory" section later in this document. **NOTE:** Intel® Hyper Threading is supported on all processors except E5-4617 and E5-4627 v2.	
	E5-4600v2 series Processors	
	HP BL660c Gen8 Intel® Xeon® E5-4657Lv2 (2.4GHz/12-core/30MB/115W) FIO 2-processor Kit	727590-L21
	HP BL660c Gen8 Intel® Xeon® E5-4650v2 (2.4GHz/10-core/25MB/95W) FIO 2-processor Kit	727576-L21
	HP BL660c Gen8 Intel® Xeon® E5-4640v2 (2.2GHz/10-core/20MB/95W) FIO 2-processor Kit	727578-L21
	HP BL660c Gen8 Intel® Xeon® E5-4627v2 (3.3GHz/8-core/16MB/130W) FIO 2-processor Kit	727588-L21
	HP BL660c Gen8 Intel® Xeon® E5-4620v2 (2.6GHz/8-core/20MB/95W) FIO 2-processor Kit	727580-L21
	HP BL660c Gen8 Intel® Xeon® E5-4610v2 (2.3GHz/8-core/16MB/95W) FIO 2-processor Kit	727582-L21
	HP BL660c Gen8 Intel® Xeon® E5-4607v2 (2.6GHz/6-core/15MB/95W) FIO 2-processor Kit	727584-L21
	HP BL660c Gen8 Intel® Xeon® E5-4603v2 (2.2GHz/4-core/10MB/95W) FIO 2-processor	727586-L21

Kit

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server.
NOTE: HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html
NOTE: LRDIMMs and RDIMMs are all distinct memory technologies and cannot be mixed within a server.
NOTE: A minimum of one DIMM is required per processor.
NOTE: Depending on the memory configuration and processor model, 1866MHz, 1600MHz and 1333MHz memory may operate at a lower speed. Please see the see the "Memory" section later in this document and the Online Memory Configuration Tool for details at www.hp.com/go/ddr3memory-configurator.
NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

HP SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v2 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713981-B21
HP 4GB (1x4GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708637-B21
HP 8GB (1x8GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	731765-B21
HP 8GB (1x8GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	731761-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713985-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708641-B21

Registered DIMMs (RDIMMs) - E5-4600 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21

NOTE: When HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kits are used, all DIMM slots for the associated processor sockets must be fully populated with these 24GB DIMMs. If two processor sockets are populated, all 16 DIMM slots must be populated with 24GB DIMMs. If all four processor sockets are populated, all 32 DIMM slots must be populated with 24GB DIMMs.

Load Reduced DIMMs (LRDIMMs) - E5-4600 v2 series Processors

Configuration Information - Factory Integrated Models

	HP 32GB (1x32GB) Quad Rank x4 PC3-14900L (DDR3-1866) Load Reduced CAS-13 Memory Kit	708643-B21
	Load Reduced DIMMs (LRDIMMs) - E5-4600 series Processors	
	HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21
HP Networking	**FlexibleLOM Adapters**	
	NOTE: The ProLiant BL660c Gen8 supports one or two FlexibleLOMs. **NOTE:** For a single FlexibleLOM Factory Integrated Model configuration, select the option here in the "Step 2" HP Networking section. **NOTE**: For a two FlexibleLOM Factory Integrated Model configuration, the second FlexibleLOM is a different part number. When two FlexibleLOMs are needed you must select the first FlexibleLOM here in the "Step 2" HP Networking section and the second FlexibleLOM from "Step 4" HP Networking section. **NOTE:** All FlexibleLOMs are dual port: one port is routed to interconnect module bay 1 and the other to bay 2.	
	10/20 GbE Ethernet FlexibleLOMs	
	HP FlexFabric 20Gb 2-port 630FLB FIO Adapter **NOTE:** For a two FlexibleLOM configuration, the HP FlexFabric 20Gb 2-port 630FLB FIO Adapter may be configured with the HP FlexFabric 20Gb 2-port 630FLB Adapter (700066-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).	700066-B21
	HP Flex-10 10Gb 2-port 530FLB FIO Adapter **NOTE:** For a two FlexibleLOM configuration, the HP Flex-10 10Gb 2-port 530FLB FIO Adapter may be configured with the HP Flex-10 10Gb 2-port 530FLB Adapter (656590-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).	684211-B21
	HP FlexFabric 10Gb 2-port 534FLB FIO Adapter **NOTE:** For a two FlexibleLOM configuration, the HP FlexFabric 10Gb 2-port 534FLB FIO Adapter may be configured with the HP FlexFabric 10Gb 2-port 534FLB Adapter (700741-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).	700742-B21
	HP FlexFabric 10Gb 2-port 554FLB FIO Adapter **NOTE:** For a two FlexibleLOM configuration, the HP FlexFabric 10Gb 2-port 554FLB FIO Adapter may be configured with the HP FlexFabric 10Gb 2-port 554FLB Adapter (647586-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).	684212-B21
	HP Ethernet 10Gb 2-port 560FLB FIO Adapter **NOTE:** For a two FlexibleLOM configuration, the HP 10Gb 2-port 560FLB FIO Adapter may be configured with the HP 10Gb 2-port 560FLB Adapter (655639-B21).	684214-B21
HP Storage Controllers	**Optional Upgrades**	
	HP 512MB FBWC for BL660c FIO Kit **NOTE:** Please see the Smart Array Advanced Pack 2.0 QuickSpecs for Technical Specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/13200_na/13200_na.html. (Smart Array Advanced Pack)	694033-B21

Step 3: Choose Additional Factory Integration Options

HP Insight Software	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Single Server FIO License	C6N36A

Configuration Information - Factory Integrated Models

Converged Infrastructure Management Software	**HP OneView with iLO Advanced - Server hardware required on same purchase order**	
	HP OneView for Blade Server incl 3yr 24x7 Supp FIO Bundle Physical 1 Svr Lic	F6Q89A
	HP OneView for Blade Server incl 3yr 24x7 Supp FIO Bundle 1 Svr E-LTU	F6Q89AAE
HP Storage Blades	HP D2220sb Configure-to-order Storage Blade **NOTE:** The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s) that directly connect to the server via the enclosure midplane **NOTE:** Please see the QuickSpecs for technical specifications and additional information at http://h18006.www1.hp.com/storage/bladesystem/index.html	QW918A

Step 4: Choose Additional Options for Factory Integration

NOTE: For additional options, including server blade enclosures interconnect, mezzanine options and power subsystem options; please see the Core Options and Additional sections below; or the following:

- HP BladeSystem c3000 Enclosure QuickSpecs:
  http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html
  NOTE: The c3000 HP c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
  NOTE: The ProLiant BL660c Gen8 requires the c3000 Enclosure to be configured with 6 fans.
- HP BladeSystem c7000 Enclosure QuickSpecs:
  http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.html
  NOTE: The c7000 HP c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
  NOTE: The ProLiant BL660c Gen8 requires the c7000 Enclosure to be configured with 10 fans.
- HP BladeSystem c-Class Interconnect and Mezzanine Components:
  http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html and
  http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html

Core Options

HP Networking

10/20Gb Ethernet Mezzanines

NOTE: All 10Gb Ethernet adapters are Type A mezzanine cards that can be installed in any of the BL660c Gen8 mezzanine slots.
NOTE: Each 10 Gigabit Ethernet adapter requires a minimum of 2GB of server memory.
NOTE: A 10 Gigabit Ethernet adapter supports linking at 1Gbps or 10Gbps when connected to an interconnect module with 10Gb Ethernet downlinks.
NOTE: A 10 Gigabit Ethernet adapter supports linking at only 1Gbps when connected to an interconnect module with 1Gb Ethernet downlinks.
NOTE: The 10 Gigabit Ethernet adapters on each server blade connect to a 10Gb interconnect in bays 3-6 (HP BladeSystem c7000 Enclosure) or bays 2-4 (HP BladeSystem c3000 Enclosure).

HP FlexFabric 20Gb 2-port 630M Adapter 700076-B21

HP Ethernet 10Gb 2-port 560M Adapter 665246-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18004.www1.hp.com/products/quickspecs/14478_na/14478_na.html.

HP FlexFabric 10Gb 2-port 554M Adapter 647590-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14221_na/14221_na.html.

HP Flex-10 10Gb 2-port 552M Adapter 674764-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14218_na/14218_na.html.

HP FlexFabric 10Gb 2-port 534M Adapter 700748-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14617_na/14617_na.html

HP Flex-10 10Gb 2-port 530M Adapter 631884-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14217_na/14217_na.html.

10/20Gb Ethernet FlexibleLOM Adapters

NOTE: All 1Gb Ethernet adapters are Type A mezzanine cards that can be installed in any of the BL660c Gen8 mezzanine slots.

HP Ethernet 1Gb 4-port 366M Adapter 615729-B21

10Gb Ethernet FlexibleLOM Adapters

NOTE: The server supports one or two FlexibleLOMs.
NOTE: For Pre-configured Model configurations, two FlexibleLOMs are already included; no additional FlexibeLOMs are added.
NOTE: For a Factory Integrated Model configuration with one FlexibleLOM, it is added in the HP Networking section of "Step 2" in the Factory Integrated Models section earlier in this document; it is not added here.
NOTE: For a Factory Integrated Model configuration with two FlexibleLOMs, the second FlexibleLOM is a different part number. You must select the first FlexibleLOM earlier in this document in the "Step 2" HP Networking section and select the second FlexibleLOM here in the "Step 4" HP Networking section.
NOTE: The FlexibleLOMs here can also be used change the FlexibleLOM(s) that original came with the server.
NOTE: All FlexibleLOMs are dual port: one port is routed to interconnect module bay 1 and the other to bay 2.

HP FlexFabric 20Gb 2-port 630FLB Adapter 700065-B21

HP Flex-10 10Gb 2-port 530FLB Adapter 656590-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14216_na/14216_na.html.

Core Options

	HP FlexFabric 10Gb 2-port 534FLB Adapter **NOTE:** Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14617_na/14617_na.html	700741-B21
	HP FlexFabric 10Gb 2-port 554FLB Adapter **NOTE:** Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14219_na/14219_na.html.	647586-B21
	HP Ethernet 10Gb 2-port 560FLB Adapter **NOTE:** Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14331_na/14331_na.html.	655639-B21
	1Gb Ethernet FlexibleLOM Adapters **NOTE:** The server supports one or two FlexibleLOMs. Two are already included in the Pre-configured Models and the first one is added per Step 2 for Factory Integrated Models. The 1GbE FlexibleLOM option below is used to change the original 10Gb FlexibleLOM(s) that originally came with the server. **NOTE:** For a two FlexibleLOM configuration, the two FlexibleLOMs must be identical.	
	HP Ethernet 1Gb 2-port 361FLB Adapter **NOTE:** Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14333_na/14333_na.html	652500-B21
	HP Infiniband Mezzanine Adapters **NOTE:** When an InfiniBand adapter is installed in mezzanine slot 1, only one port is active (regardless of operating mode). When installed in any other mezzanine slot, both ports are active.	
	HP Infiniband QDR/Ethernet 10Gb 2-port 544M Adapter **NOTE:** The QDR InfiniBand adapter may be installed in any mezzanine slot of the server.	644160-B21
	HP Infiniband FDR/Ethernet 10Gb/40Gb 2-port 544M Adapter **NOTE:** The FDR InfiniBand adapter must be installed in mezzanine slot 1 for FDR mode and may be installed in any mezzanine slot if operated in any other mode.	644161-B22
	HP InfiniBand FDR 2-port 545M Adapter **NOTE:** InfiniBand QDR and FDR speeds are only supported on the HP BladeSystem c7000 Enclosure. For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12586_na/12586_na.html http://h18000.www1.hp.com/products/quickspecs/13078_na/13078_na.html	702213-B21
HP Fibre Channel	HP LPe1605 16Gb Fibre Channel HBA for BladeSystem c-Class **NOTE:** Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14742_na/14742_na.html	718203-B21
	HP LPe1205A 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class **NOTE:** This is a Type A mezzanine card that can be installed in any of the BL660c Gen8 mezzanine slots. **NOTE:** Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/14338_na/14338_na.html	659818-B21
	HP QMH2572 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class **NOTE:** This is a Type A mezzanine card that can be installed in any of the BL660c Gen8 mezzanine slots. **NOTE:** Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/14230_na/14230_na.html	651281-B21
	HP QMH2672 16Gb Fibre Channel Host Bus Adapter **NOTE:** This is a Type A mezzanine card that can be installed in any of the BL660c Gen8	710608-B21

Core Options

mezzanine slots.

NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14622_na/14622_na.html

HP Processors

NOTE: The BL660c Gen8 supports two or four processors; one and three processor configurations are not supported.
NOTE: All processor kits contain two (2) processors.
NOTE: All processors within the server must be identical.
NOTE: The processor model as well as the memory configuration determines the maximum speed memory can operate. Please see the see the "Memory" section later in this document.
NOTE: Intel® Hyper Threading is supported on all processors except E5-4617 and E5-4627 v2.

E5-4600 v2 series Processors

HP BL660c Gen8 Intel® Xeon® E5-4657Lv2 (2.4GHz/12-core/30MB/115W) 2-processor Kit	727590-B21
HP BL660c Gen8 Intel® Xeon® E5-4650v2 (2.4GHz/10-core/25MB/95W) 2-processor Kit	727576-B21
HP BL660c Gen8 Intel® Xeon® E5-4640v2 (2.2GHz/10-core/20MB/95W) 2-processor Kit	727578-B21
HP BL660c Gen8 Intel® Xeon® E5-4627v2 (3.3GHz/8-core/16MB/130W) 2-processor Kit	727588-B21
HP BL660c Gen8 Intel® Xeon® E5-4620v2 (2.6GHz/8-core/20MB/95W) 2-processor Kit	727580-B21
HP BL660c Gen8 Intel® Xeon® E5-4610v2 (2.3GHz/8-core/16MB/95W) 2-processor Kit	727582-B21
HP BL660c Gen8 Intel® Xeon® E5-4607v2 (2.6GHz/6-core/15MB/95W) 2-processor Kit	727584-B21
HP BL660c Gen8 Intel® Xeon® E5-4603v2 (2.2GHz/4-core/10MB/95W) 2-processor Kit	727586-B21

E5-4600 series Processors

HP BL660c Gen8 Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) 2-processor Kit	679098-B21
HP BL660c Gen8 Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) 2-processor Kit	679110-B21
HP BL660c Gen8 Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) 2-processor Kit	679100-B21
HP BL660c Gen8 Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) 2-processor Kit	679102-B21
HP BL660c Gen8 Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) 2-processor Kit	679112-B21
HP BL660c Gen8 Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) 2-processor Kit	679104-B21
HP BL660c Gen8 Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) 2-processor Kit	679106-B21
HP BL660c Gen8 Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) 2-processor Kit	679108-B21

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html
NOTE: LRDIMMs and RDIMMs are all distinct memory technologies and cannot be mixed within a server.
NOTE: A minimum of one DIMM is required per processor.
NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

HP SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v2 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low	713981-B21

Core Options

	Voltage Memory Kit	
	HP 4GB (1x4GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708637-B21
	HP 8GB (1x8GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	731765-B21
	HP 8GB (1x8GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	731761-B21
	HP 16GB (1x16GB) Dual Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713985-B21
	HP 16GB (1x16GB) Dual Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708641-B21
	Registered DIMMs (RDIMMs) - E5-4600 series Processors	
	HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
	HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
	HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
	HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
	HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
	HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
	HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21
	HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21
	NOTE: When HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kits are used, all DIMM slots for the associated processor sockets must be fully populated with these 24GB DIMMs. If two processor sockets are populated, all 16 DIMM slots must be populated with 24GB DIMMs. If all four processor sockets are populated, all 32 DIMM slots must be populated with 24GB DIMMs.	
	Load Reduced DIMMs (LRDIMMs) - E5-4600 v2 series Processors	
	HP 32GB (1x32GB) Quad Rank x4 PC3-14900L (DDR3-1866) Load Reduced CAS-13 Memory Kit	708643-B21
	Load Reduced DIMMs (LRDIMMs) - E5-4600 series Processors	
	HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

HP Hard Drives

NOTE: The ProLiant BL660c Gen8 server includes the new HP hot-plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HP drives from previous generation servers are not compatible with the BL660c Gen8 drive bays.
NOTE: HP hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.
NOTE: The hard drive options are not required when configuring a drive-less model.
NOTE: The mixing of standard SAS drives with SAS SSD drives is supported within the

server, but limits the RAID configuration to two separate RAID 0 volumes. Mixing of other drives types is not supported.

HP SAS Hot Plug SmartDrive Carriers for Gen8 Servers only

6G SAS Hot Plug with SmartDrive SFF (2.5-inch) Enterprise Drives

HP 1.2TB 6G SAS 10K rpm SFF (2.5-inch) SC Dual Port Enterprise 3yr Warranty Hard Drive	718162-B21
HP 900GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652589-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652583-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652572-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652564-B21
HP 300GB 6G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652611-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652605-B21
HP 600GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	759212-B21
HP 450GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	759210-B21
HP 300GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	759208-B21

6G SAS Hot Plug SmartDrive SFF (2.5-inch) Midline Drives

HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	652749-B21
HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	652745-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/12244_na/12244_na.html.

12G SAS (2.5-inch) 512e SC HDD

HP 600GB 12G SAS 15K rpm SFF (2.5-inch) SC 512e Enterprise 3yr Warranty Hard Drive	748387-B21
HP 1TB 12G SAS 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive	765464-B21
HP 1.8TB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 512e 3yr Warranty Hard Drive	791034-B21
HP 2TB 12G SAS 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive	765466-B21

6G SATA Hot Plug with SmartDrive SFF (2.5-inch) Midline (MDL) Drives

HP 1TB 6G SATA 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	655710-B21
HP 500GB 6G SATA 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	655708-B21

NOTE: Please see the QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/13021_na/13021_na.html.

6G SATA (2.5-inch) 512e SC HDD

HP 1TB 6G SATA 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive	765453-B21
HP 2TB 6G SATA 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive	765455-B21

12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

HP 400GB 12G SAS High Endurance SFF 2.5-in SC Enterprise Performance 3yr Wty Solid State Drive	741155-B21

NOTE: This drive supports Gen8 servers only.

12G SAS Hot Plug SFF (2.5-inch) SC ENT HDD

HP 1.2TB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	781518-B21
HP 900GB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	785069-B21

Core Options

HP 600GB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	781516-B21
HP 300GB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	785067-B21

12G SAS Mainstream Endurance Hot Plug SFF (2.5-inch) Enterprise Mainstream H2 Solid State Drives

HP 200GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779164-B21
HP 400GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779168-B21
HP 800GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779172-B21
HP 1.6TB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779176-B21

12G SAS Value Endurance SFF (2.5-inch) SC Enterprise Value Solid State Drives

HP 1.6TB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	757339-B21
HP 1.6TB 12G SAS Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	762263-B21
HP 800GB 12G SAS Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	762261-B21

6G SATA Read Intensive (2.5-inch) SC G2 Solid State Drive

HP 240GB 6G SATA Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	789135-B21
HP 480GB 6G SATA Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	789145-B21
HP 960GB 6G SATA Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	789155-B21

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Boot Solid State Drives

HP 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Boot 3yr Wty Solid State Drive **NOTE:** This drive supports Gen8 servers only.	717965-B21
HP 80GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Boot 3yr Wty Solid State Drive	734360-B21

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives

HP 800GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive **NOTE:** This drive supports Gen8 servers only.	717973-B21
HP 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive **NOTE:** This drive supports Gen8 servers only.	717971-B21
HP 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive **NOTE:** This drive supports Gen8 servers only.	717969-B21

NOTE: Please see the QuickSpecs for technical specifications and information at: http://h18000.www1.hp.com/products/quickspecs/14038_na/14038_na.html.

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value M1 Solid State Drives

Core Options

HP 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764923-B21
HP 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764925-B21
HP 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764927-B21
HP 800GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764929-B21
6G SATA VE Hot Plug SFF(2.5-inch) SC EV G1 Solid State Drives	
HP 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty G1 Solid State Drive	756657-B21
HP 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty G1 Solid State Drive	756636-B21
HP 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty G1 Solid State Drive	756621-B21
6G SATA LE Hot Plug SFF(2.5-inch) SC EL G1 Solid State Drives	
HP 960GB 6G SATA Light Endurance SFF 2.5-in SC Enterprise Light 3yr Wty G1 Solid State Drive	756601-B21
6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Boot Solid State Drives	
HP 600GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	739898-B21
HP 300GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	739888-B21
6G SATA ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives	
HP 800GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	691868-B21
HP 400GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	691866-B21
HP 200GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	691864-B21
HP 100GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	691862-B21
12G SAS Write Intensive SFF (2.5-inch) SC 3yr Wty H2 Solid State Drive	
HP 200GB 12G SAS Write Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	802578-B21
HP 400GB 12G SAS Write Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	802582-B21
HP 800GB 12G SAS Write Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	802586-B21
HP 1.92TB 12G SAS Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive	802891-B21

Additional Options

HP Insight Software

HP Insight Control

HP Insight Control including 1yr 24x7 Technical Support and Updates Single Server License	C6N27A
HP Insight Control Server Provisioning Media Kit	BD883A
HP Insight Management Media Kit	C6N31A

NOTE: HP Insight Management Media Kit contains DVDs without licenses. Contains HP Systems Insight Manager, HP Insight Control, HP Matrix Operating Environment, and Virtual Connect Enterprise Manager software. Uses an integrated installer to perform quick and accurate software installation and updates.
NOTE: HP Insight Control 7.2 introduces Insight Control server provisioning, a new capability ideal for multi-server OS and firmware provisioning to ProLiant and BladeSystem servers. Insight Control server provisioning is included and licensed as part of HP Insight Control. A media kit, "HP Insight Control server provisioning USB media kit" (# BD883A), including a USB, is available for customers who require a physical copy of the media loaded with Insight Control server provisioning software. Please note that this media kit is separate and in addition to the "HP Insight Management DVD media kit" (#C6N31A).
NOTE: Electronic and Flexible-Quantity licenses can be used to purchase multiple licenses with a single activation key.
NOTE: Customer will receive a license entitlement certificate. The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support and Update Service.
NOTE: Licenses ship without media. The HP Insight Management Media Kit can be ordered separately, or can be downloaded at: http://www.hp.com/go/insightupdates.
NOTE: For additional license options please see the Insight Control QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/12631_na/12631_na.html

HP Insight Control server deployment

HP Insight Control Server Deployment including 1yr 24x7 Support Electronic License	T9082AAE
HP Insight Control Server Deployment including 1yr 24x7 Support Single Server License	452151-B21

NOTE: Licenses ship without media. The HP Insight Management Media Kit can be ordered separately, or can be downloaded at http://www.hp.com/go/insightupdates.
NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support Service.
NOTE: For additional license kits please see the Insight Control QuickSpecs at http://h18004.www1.hp.com/products/quickspecs/12631_na/12631_na.html.

Converged Infrastructure Management Software

HP OneView

HP OneView with iLO Advanced

HP OneView incl 3yr 24x7 Supp Phys 1 Svr Lic	E5Y34A
HP OneView incl 3yr 24x7 Supp Flex Qty E-LTU	E5Y35AAE
HP OneView Media Kit Phys No Lic	E5Y37A

HP OneView without iLO Advanced

HP OneView w/o iLO Adv incl 3yr 24x7 Supp Phys 1 Svr Lic	E5Y38A
HP OneView w/o iLO Adv inc 3yr 24x7 Supp Flex Qty E-LTU	E5Y39AAE

NOTE: For additional license kits please see the QuickSpecs at http://h18004.www1.hp.com/products/quickspecs/14621_na/14621_na.html.

Additional Options

HP iLO Advanced License	**HP Integrated Lights-Out (iLO) Advanced for ProLiant BladeSystem Remote Management**	
	HP iLO Advanced for BladeSystem including 3yr 24x7 Technical Support and Updates E-LTU	E6U63ABE
	HP iLO Advanced Blade 1 Server License with 3yr 24x7 Tech Support and Updates	BD502A
	HP iLO Advanced for BladeSystem including 1yr 24x7 Support Single Server License	512488-B21
	HP iLO Advanced for BladeSystem including 1yr 24x7 Support Eight Server License	512489-B21
	HP Integrated Lights-Out (iLO)	
	HP iLO Scale Out	
	HP Integrated Lights-Out Scale-Out 3yr 24x7 Tech Support and Updates Flex Quantity License	BD776A
	HP Integrated Lights-Out Scale-Out 1yr 24x7 Tech Support and Updates Flex Quantity License	BD778A
	HP Integrated Lights-Out Scale-Out including 3yr 24x7 Tech Support and Updates Flex Qty E-LTU	BD776AAE
	HP Integrated Lights-Out Scale-Out including 1yr 24x7 Tech Support and Updates Flex Qty E-LTU	BD778AAE
	HP Integrated Lights-Out Scale-Out including 3yr 24x7 Tech Support and Updates Tracking License	BD777A
	HP Integrated Lights-Out Scale-Out including 1yr 24x7 Tech Support and Updates Tracking License	BD779A
	NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one or three years of 24 x 7 HP Software Technical Support Service. **NOTE:** For additional license kits, including electronic delivery options, please see the iLO QuickSpecs at http://www.hp.com/go/iLO	
High Performance Clusters	**HP Cluster Management Utility**	
	HP Insight Cluster Management Utility 1yr 24x7 Flexible License	QL803B
	HP Insight Cluster Management Utility 3yr 24x7 Flexible License **NOTE:** These part numbers can be used to purchase one certificate for multiple licenses and support with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key. Customer also will receive a support agreement.	BD476A
	HP Insight Cluster Management Utility Media **NOTE:** For additional license kits please see the QuickSpecs at http://h18004.www1.hp.com/products/quickspecs/12612_na/12612_na.html.	BD477A
HP I/O Accelerator Options	**NOTE:** The HP I/O Accelerator Options are Type B mezzanine cards that can be installed in BL660c Gen8 mezzanine slots 2 and 3.	
	HP 1.2TB Multi Level Cell IO Accelerator for BladeSystem c-Class	QK763A
	HP 785GB Multi Level Cell IO Accelerator for BladeSystem c-Class	QK762A
	HP 365GB Multi Level Cell IO Accelerator for BladeSystem c-Class	QK761A
	HP 1.2TB Read Intensive Mezzanine PCIe Workload Accelerator for BladeSystem c-Class	794603-B21
	HP 1.6TB Read Intensive Mezzanine PCIe Workload Accelerator for BladeSystem c-Class	794605-B21

Additional Options

HP Security	HP Trusted Platform Module Option	488069-B21
	NOTE: The TPM (Trusted Platform Module) is a microcontroller chip that can securely store artifacts used to authenticate the server platform. These artifacts can include passwords, certificates and encryption keys. Windows® BitLocker™ Drive Encryption (BitLocker) is a data protection feature available in Windows Server® 2008. BitLocker leverages the enhanced security capabilities of a Trusted Platform Module (TPM) version 1.2. The TPM works with BitLocker to help protect user data and to ensure that a server running Windows Server 2008 has not been tampered with while the system was offline. **NOTE:** For more information about TPM, including a white paper, go to http://www.hp.com/go/TPM. **NOTE:** ProLiant OS pre-installed units will come with the partition required for TPM deployment. **NOTE:** The TPM key is unique to every TPM deployed server and must be retained. Misplacing or losing the key could result in data loss.	
HP Storage Controller	**HP Smart Array P731m Controller** **NOTE:** The HP Smart Array P731m Controller is a Type B mezzanine card that can be installed in BL660c Gen8 mezzanine slots 2 and 3. **NOTE:** The BL660 has three installation locations for the "capacitor pack" that comes with the FBWC on Smart Array controllers. The first install location is for the embedded Smart Array P220i Controller. The second install location is for an optional Smart Array controller Type A or B mezzanine card with FBWC installed in mezzanine slot 3. The third install location is for an optional Smart Array controller mezzanine card with FBWC installed in either mezzanine slot 1 (Type A only) or slot 2 (Type A or B).	
	HP Smart Array P731m/2GB FBWC 6Gb 4-ports Ext Mezzanine SAS Controller	698535-B21
	HP Smart Array P731m/512 FBWC 6Gb 4-ports Ext Mezzanine SAS Controller	698536-B21
	HP Smart Array P721m Controller **NOTE:** The HP Smart Array P721m Controller is a Type B mezzanine card that can be installed in BL660c Gen8 mezzanine slots 2 and 3. **NOTE:** The BL660 has three installation locations for the "capacitor pack" that comes with the FBWC on Smart Array controllers. The first install location is for the embedded Smart Array P220i Controller. The second install location is for an optional Smart Array controller Type A or B mezzanine card with FBWC installed in mezzanine slot 3. The third install location is for an optional Smart Array controller mezzanine card with FBWC installed in either mezzanine slot 1 (Type A only) or slot 2 (Type A or B).	
	HP Smart Array P721m/2GB FBWC 6Gb 4-ports Ext Mezzanine SAS Controller	650072-B21
	HP Smart Array P721m/512 FBWC 6Gb 4-ports Ext Mezzanine SAS Controller	655636-B21
	NOTE: For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14626_na/14626_na.html. (Smart Array P731m Controller) http://h18000.www1.hp.com/products/quickspecs/14404_na/14404_na.html. (Smart Array P721M Controller)	
HP Secure Encryption	HP Secure Encryption No Media E-LTU per Drive	D8S85AAE
	HP Secure Encryption No Media Flexible License per Drive	D8S84A
	NOTE: HP Secure Encryption is supported on the HP Smart Array P731m and the P230i as an option. HP Secure Encryption licensing is based on the number of physical drives requiring encryption. **NOTE:** For more information about HP Secure Encryption, go to www.hp.com/go/hpsecureencryption.	

Additional Options

HP InfiniBand Mezzanines	**NOTE:** When an InfiniBand adapter is installed in mezzanine slot 1, only one port is active (regardless of operating mode). When installed in any other mezzanine slot, both ports are active. **NOTE:** InfiniBand QDR and FDR speeds are only supported on the HP BladeSystem c7000 Enclosure. For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12586_na/12586_na.html http://h18000.www1.hp.com/products/quickspecs/13078_na/13078_na.html	
	HP InfiniBand FDR 2-port 545M Adapter	702213-B21
	HP Infiniband QDR/Ethernet 10Gb 2-port 544M Adapter **NOTE:** The QDR InfiniBand adapter may be installed in any mezzanine slot of the server.	644160-B21
	HP Infiniband FDR/Ethernet 10Gb/40Gb 2-port 544M Adapter **NOTE:** The FDR InfiniBand adapter must be installed in mezzanine slot 1 for FDR mode and may be installed in any mezzanine slot if operated in any other mode.	644161-B22
	NOTE: InfiniBand QDR and FDR speeds are only supported on the HP BladeSystem c7000 Enclosure. For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12586_na/12586_na.html http://h18000.www1.hp.com/products/quickspecs/13078_na/13078_na.html	
HP Ultrium Tape Blades	**NOTE:** The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s)) that directly connect to the server via the enclosure midplane. **NOTE:** For the above Ultrium tape drives, please see the QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/12729_na/12729_na.html	
	HP StoreEver LTO-4 Ultrium SB1760c Tape Blade **NOTE:** LTO-4 Ultrium tape technology.	AQ697B
	HP StoreEver LTO-5 Ultrium SB3000c Tape Blade **NOTE:** LTO-5 Ultrium tape technology.	BS580B
HP Storage Blades	**NOTE:** The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s) that directly connect to the server via the enclosure midplane **NOTE:** Please see the QuickSpecs for technical specifications and additional information at: http://h18006.www1.hp.com/storage/bladesystem/index.html	
	HP D2200sb PCIe Storage Blade	AP880A
	HP D2220sb PCIe and StoreVirtual VSA Bundle	QW914A
	HP D2220sb PCIe w/(12) 900 GB 6G SAS HDD Bundle	QW915A
	HP D2220sb Build-to-order Storage Blade	QW917A
	NOTE: For additional information, please see the QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14507_na/14507_na.html	
HP Expansion Blade	HP BLc PCI Expansion Blade **NOTE:** The PCI Expansion Blade provides PCI card slots for an adjacent c-Class Server Blade. **NOTE:** The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s) that directly connect to the server via the enclosure midplane. **NOTE:** The PCI Expansion Blade ships with one pre-installed PCI-X connect board. Also includes one PCIe connect board which requires installation.	448018-B21

Additional Options

NOTE: Please see the QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/12753_na/12753_na.html

HP Flash Media Kits USB Drives	**for HP Enterprise Mainstream Flash Media Kits for Memory Cards**	
	HP 8GB USB Enterprise Mainstream Flash Media Drive Key Kit	737953-B21
	HP 8GB microSD Enterprise Mainstream Flash Media Kit	726116-B21
	HP 32GB microSD Enterprise Mainstream Flash Media Kit	700139-B21
HP Care Pack Services	**Proactive Care** - Collaborative Support plus Proactive services delivered by the on shore/near shore Advanced Solution Center (ASC) and backed by the global delivery organization, end-to-end case ownership from a Technical Solution Specialists and Technical Account Manager who remotely delivers firmware/software revision management, proactive scans and incident trend reports. Recommended for customers running a virtualized infrastructure and/or customers who desire an enhanced call support experience.	
	HP 3 year 4 hour 24x7 ProLiant BL6xxc Proactive Care Service	U3B32E
	HP 3 year 4 hour 24x7 with Defective Media Retention ProLiant BL6xxc Proactive Care Service	U3B35E
	HP 3 year 6 hour Call To Repair 24x7 ProLiant BL6xxc Proactive Care Service	U3B38E
	HP 3 year 6hr Call To Repair 24x7 with Defective Media Retention ProLiant BL6xxc Proactive Care SVC	U3B41E
	Proactive Care Personalized Support Environmental Option - to add an onsite Account Support Manager (ASM) to Proactive Care. ASM is an assigned resource who delivers support planning and brings technical expertise and best practices advice for the customer's environment.	
	HP 3 year ISS ProactiveCare Personalized Support	U6W98E
	Installation Services - reduce the time required to get your system up and running and help minimize disruptions to your business.	
	HP Install c-Class Server Blade Service	UE493E
	HP Hardware Installation during Non Standard Hours c-Class Server Blade Service	UG869E
	Additional HP Care Pack services can be found at: http://www.hp.com/go/cpc	

Memory

For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool:
www.hp.com/go/ddr3memory-configurator

Memory Subsystem Architecture
Each Intel® Xeon® E5-4600 and E5-4600v2 family processor socket contains four memory channels that support two DIMMs each for a total of eight (8) DIMM per installed processor or a grand total of thirty-two (32) DIMMs for the server. Up to 32GB capacity DIMMs are supported for 1.0TB of memory (32 DIMM slots x 32GB per DIMM).

Memory Population Rules and Guidelines:

- A minimum of one DIMM is required per processor.
- Install DIMMs only if the corresponding processor is installed.
- DIMM slots attached to each processor socket are only available if a processor is installed in that socket.
- DIMM sizes can be mixed in channel. To maximize performance, it is recommended to balance the total memory capacity between all installed processors and to load the channels similarly whenever possible.
- RDIMMs operating at either 1.35V or 1.5V may be mixed in any order, but the system will power them at the higher voltage.
- LRDIMMs and RDIMMs are distinct memory technologies and cannot be mixed within a server.
- DIMMs of different speeds may be mixed in any order; the server will select a common optimal speed.
- The maximum memory speed is a function of the memory type, memory configuration, and processor model.
- The maximum memory capacity is a function of the memory type and number of installed processors.
- HP memory from previous generation servers is not compatible with the BL660c Gen8 Server Blade.
- When HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kits are used, all DIMM slots for the associated processor sockets on the BL660c Gen8 must be fully populated with these 24GB DIMMs. If two processor sockets are populated, all 16 DIMM slots for those sockets must be populated with 24GB DIMMs. If four processor sockets are populated, all 32 DIMM slots must be poplulated with 24GB DIMMs.
- To realize the performance memory capabilities listed in this document, HP SmartMemory is required. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html.
- For memory population rules and additional memory guidelines, please see the BL660c Gen8 user guide at http://www.hp.com/support.

BL660c Gen8 Supported Memory Bandwidth

DIMM Type	Registered DIMMS (RDIMMs)														Load Reduced (LRDIMMs)	
DIMM Rank	Single Rank (1R)							Dual Rank (2R)						Three Rank (3R)	Quad Rank (4R)	
DIMM Capacity	4GB	4GB	4GB	4GB	8GB	8GB	8GB	8GB	8GB	16GB	16GB	16GB	16GB	24GB	32GB	32GB
DIMM Native Speed (MHz)	1333	1600	1600	1866	1600	1600	1866	1333	1600	1333	1600	1600	1866	1333	1333	1866
Voltage*	LV	Std	LV	Std	Std	LV	Std	LV	Std	LV	Std	LV	Std	LV	LV	Std
* LV= low voltage at 1.35V; Std = standard voltage at 1.5V.																
Slots That Can Be Populated	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Maximum Capacity (GB)	128	128	128	128	256	256	256	256	256	512	512	512	512	768	1024	1024

Memory

Populated DIMM Speed (MHz)																
1 DIMM Per Channel	1333	1600	1600	1866	1600	1600	1866	1333	1600	1333	1600	1600	1866	N/A	1333***	1866
2 DIMM Per Channel	1333**	1600	1600	1866	1600	1600	1866	1333**	1600	1333**	1600	1600	1866	1333#	1333***	1866

** Using HP SmartMemory, 1333MHz DIMMs operate at 1.35V for 2 DIMMs per channel (2DPC). Third party 1333MHz DIMM memory may only support 1.5V at 2DPC.
*** LRDIMM enables 3 DIMMs per channel. HP SmartMemory will support up to 3DPC@DDR3-1066 at 1.35V. Third party memory may only support 3DPC @DDR3-1066 at 1.5V.
# Only supported on BL460c and BL660c

NOTE: Memory speed is a function of the processor QPI bus speed; see the table below "Memory Speed by Processor Model".

Memory Speed by Processor Model

Processor Models	Supported Memory Speeds
E5-4650v2, E5-4640v2, E5-4627v2, E5-4650Lv2	1866/1600/1333/1066MHz
E5-4620v2, E5-4610v2, E5-4650, E5-4650L, E5-4640, E5-4617	1600/1333/1066MHz
E5-4607v2, E5-4603v2, E5-4620, E5-4617, E5-4610, E5-4607	1333/1066MHz
E5-4603, E5-4607	1066MHz

Standard and Maximum Memory Capacity (Pre-configured Models)

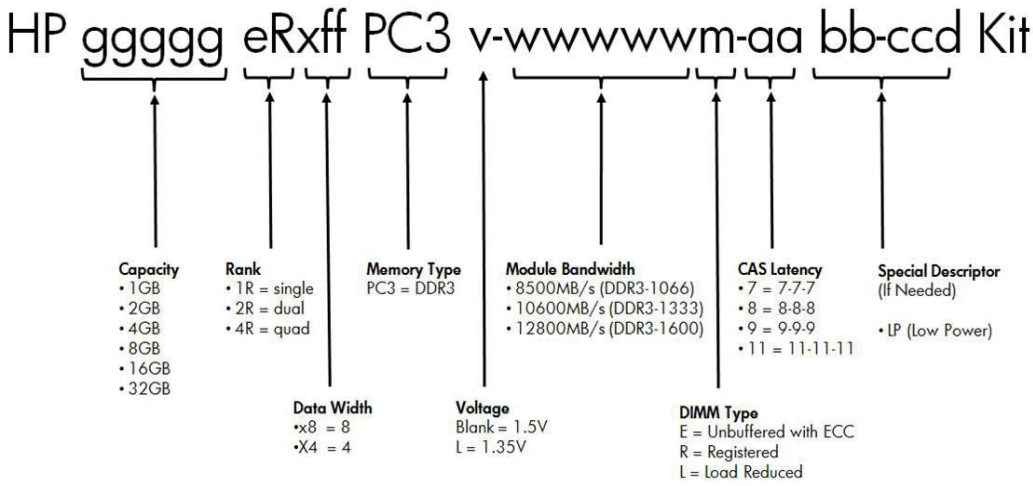
Pre Configured Models	Standard Memory	Maximum Memory Plus Optional Memory	Standard Memory Replaced with Optional Memory
Intel Xeon E5-4650v2, E5-4620v2	128GB (8x 16GB)	512GB (24x 16GB)	1024GB (32x 32GB)
Intel Xeon E5-4607v2	64GB (4x 16GB)	512GB (28x 16GB)	1024GB (32x 32GB)
Intel Xeon E5-4650, E5-4620, and E5-4617	128GB (16x 8GB)	384GB (16x 8GB + 16x 16GB)	1024GB (32x 32GB)

NOTE: Capacity references are rounded to the common gigabyte (GB) values.

- 4GB = 4,096MB
- 8GB = 8,192MB
- 16GB = 16,384MB
- 24GB = 24,576MB
- 32GB = 32,768MB

Memory

Memory options part number decoder



Following are memory options available from HP:

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html

NOTE: LRDIMM, RDIMM and UDIMMs are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen8 servers support RDIMM, UDIMM and LRDIMM.

NOTE: A minimum of one DIMM is required per server.

NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

HP SmartMemory

Registered DIMMs (RDIMMs) - E5-4600v2 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713981-B21
HP 4GB (1x4GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708637-B21
HP 8GB (1x8GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	731765-B21
HP 8GB (1x8GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	731761-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713985-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708641-B21

Registered DIMMs (RDIMMs) - E5-4600 series Processors

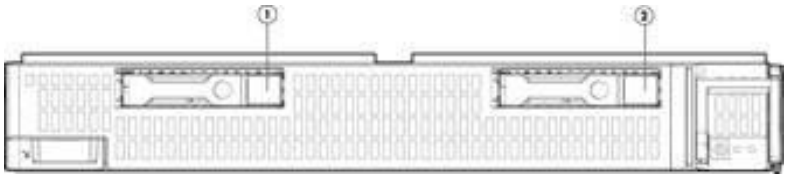
HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21

Memory

HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21
Load Reduced DIMMs (LRDIMMs) - E5-4600v2 series Processors	
HP 32GB (1x32GB) Quad Rank x4 PC3-14900L (DDR3-1866) Load Reduced CAS-13 Memory Kit	708643-B21
Load Reduced DIMMs (LRDIMMs) - E5-4600 series Processors	
HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

NOTE: Depending on the memory configuration and processor model, 1600MHz and 1333MHz memory may operate at a lower speed. Please see the see the "Memory" section later in this document and the Online Memory Configuration Tool for details at www.hp.com/go/ddr3memory-configurator.

Storage



1-2. 2 x SFF hot-plug SAS, SATA, SAS SDD; and SATA SSD hard drives

Hard Drives

NOTE: The ProLiant BL660c Gen8 server includes the new HP hot-plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HP drives from previous generation servers are not compatible with the BL660c Gen8 drive bays.
NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.
NOTE: The hard drive options are not required when configuring a drive-less model.
NOTE: The mixing of standard SAS drives with SAS SSD drives is supported within the server, but limits the RAID configuration to two separate RAID 0 volumes. Mixing of other drives types is not supported.

SAS Hot Plug SmartDrive SFF (2.5-inch) Enterprise Drives

	Quantity Supported	Position Supported	Controller
1.2TB 6G SAS 10K 900GB 6G SAS 10K 600GB 6G SAS 10K 450GB 6G SAS 10K 300GB 6G SAS 10K 300GB 6G SAS 15K 146GB 6G SAS 15K	2	1-2	HP Smart Array P220i Controller

SAS Hot Plug SmartDrive SFF (2.5-inch) Midline Drives

	Quantity Supported	Position Supported	Controller
1TB 6G SAS 7.2K 500GB 6G SAS 7.2K	2	1-2	HP Smart Array P220i Controller

6G SATA Hot Plug with SmartDrive SFF (2.5-inch) Midline Drives

	Quantity Supported	Position Supported	Controller
1TB 6G SAS 7.2K 500GB 6G SAS 7.2K	2	1-2	HP Smart Array P220i Controller

12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 12G SAS 400GB 12G SAS 200GB 12G SAS	2	1-2	HP Smart Array P220i Controller

12G SAS Mainstream Endurance Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 12G SAS	2	1-2	HP Smart Array P220i Controller

Storage

400GB 12G SAS
200GB 12G SAS

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Boot Solid State Drives

	Quantity Supported	Position Supported	Controller
120GB 6G SATA VE Boot	2	1-2	HP Smart Array P220i Controller

6G SATA VE Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 6G SATA VE	2	1-2	HP Smart Array P220i Controller
480GB 6G SATA VE			
240GB 6G SATA VE			

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Boot Solid State Drives

	Quantity Supported	Position Supported	Controller
600GB 6G SATA VE Boot	2	1-2	HP Smart Array P220i Controller
300GB 6G SATA VE Boot			

6G SATA ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 6G SATA ME	2	1-2	HP Smart Array P220i Controller
400GB 6G SATA ME			
200GB 6G SATA ME			
100GB 6G SATA ME			

6G SAS ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 6G SAS ME	2	1-2	HP Smart Array P220i Controller
400GB 6G SAS ME			
200GB 6G SAS ME			

6G SAS SLC Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

	Quantity Supported	Position Supported	Controller
400GB 6G SAS SLC	2	1-2	HP Smart Array P220i Controller
200GB 6G SAS SLC			

Technical Specifications

System Unit	**Dimensions** (H x W x D) (with bezel)	366.27mm (14.42") x 56.54mm (2.23") x 516.67mm (20.34")	
	Weight (approximate)	Maximum: 4 processors, 2 FlexibleLOMs, 32 DIMMs, 2 hard drives, 3 mezzanine cards, and 2 flash cache batteries installed	27.1 lb (12.3 kg)
		Minimum: 2 processors, 1 FlexibleLOM, and 2 DIMMs installed	20.2 lb (9.2 kg)
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the: • HP BladeSystem c3000 Enclosure QuickSpecs at http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html **NOTE:** The ProLiant BL660c Gen8 requires the c3000 Enclosure to be configured with 6 fans. • HP BladeSystem c7000 Enclosure QuickSpecs at http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.html **NOTE:** The ProLiant BL660c Gen8 requires the c7000 Enclosure to be configured with 10 fans. To review typical system power ratings use the HP Power Advisor which is available via the online tool located at www.hp.com/go/hppoweradvisor.	
	System Inlet Temperature	Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1,000 ft) above sea level to a maximum of 3,050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).
		Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).
	Relative Humidity (non-condensing)	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
		Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
	Altitude	Operating	3,050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1,500 ft/min).
		Non-operating	9,144 m (30,000 ft). Maximum allowable

		altitude change rate is 457 m/min (1,500 ft/min).
	Acoustic Noise	For acoustic noise specifications, please see the HP BladeSystem c-Class Enclosures QuickSpecs located at: HP BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html HP BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.html
HP Smart Array P220i Controller	**Disk Drive Interface**	6G SAS (Serial Attached SCSI)
	Server Interface	x4 PCI Express host interface
	Cache Memory Speed	512MB flash backed write cache (FBWC) cache standard with Pre-configured Models and optional on Factory Integrated Models
	Logical Drives Supported	64 (with included 512MB cache)
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB
	RAID Support	RAID 1 (mirroring) and RAID 0 (striping) **NOTE:** The FBWC is not required for RAID capability. The purpose of the cache is it can increase hard drive write performance and provides data protection in case the server losses power.
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)
HP FlexFabric 10Gb 2-port 554FLB FlexibleLOM (Included with Pre-configured Models)	**Type**	Integrated dual-port KR 10Gb FlexibleLOM with FlexFabric (Flex-10, FCoE, hardware-based iSCSI, iSCSI boot, TCP/IP offload engine, and autosencing 1Gb/10Gb Ethernet capability)
	Network Processor	Emulex BE3
	Data Transfer Method	x8 PCI Express 2.0
	Network Transfer Rate	Two ports, each at 20Gbps full duplex; 40Gbps aggregate full duplex theoretical bandwidth **NOTE:** Each port is autosensing 1Gb/10Gb, and can interoperate with 1Gb or 10Gb HP BladeSystem c-Class interconnect components. Both ports will operate at the same speed. **NOTE:** Each port on the 554FLB adapter transmits from the server at 20Gbps (theoretical) full duplex.
	IEEE Compliance	802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBase-KX4) and 802.3x
	Standard Features	ProLiant Teaming including Network Fault Tolerance, Transmit Load Balancing, and Switch-Assisted Load Balancing 9K Jumbo frames (4K Jumbo frames when in FCoE mode) Microsoft Windows Receive Side Scaling (RSS) Hardware-based accelerated iSCSI iSCSI boot Flex-10 capability Fibre Channel over Ethernet (FCoE) TCP/IP offload engine (stateless TCP/IP) Autosencing 1Gb/10Gb Ethernet
Environment-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green. To recycle your product,

please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Summary of Changes

Date	Version History	Action	Description of Change:
01-Jun-2015	From Version 29 to 30	Changed	Information updated on Core Options Section.
		Added	Skus Added on Core Options Section: • 748387-B21 • 791034-B21
		Removed	Obsolete Skus Deleted: • 679098-L21 • 679110-L21 • 679100-L21 • 679102-L21 • 679112-L21 • 679104-L21 • 741151-B21 • 679106-L21 • 679108-L21 • 679114-B21 • 679115-B21 • 679116-B21 • 741159-B21
30-Mar-2015	From Version 28 to 29	Added	Skus Added: • 802578-B21 • 802582-B21 • 802586-B21 • 802891-B21 • 765453-B21 • 765455-B21 • 765464-B21 • 781518-B21 • 785069-B21 • 765466-B21 • 789135-B21 • 789145-B21 • 789155-B21 • 794603-B21 • 794605-B21 • 781516-B21 • 785067-B21
		Removed	Obsolete skus deleted: • 741146-B21 • 741138-B21 • 741142-B21
09-Feb-2015	From Version 27 to 28	Changed	Optional Features, Core Options and Service and Support sections were updated
		Added	Skus Added on HP Hard Drives: • 779164-B21 • 779168-B21 • 779172-B21 • 779176-B21 • 764923-B21 • 764925-B21 • 764927-B21 • 764929-B21
01-Dec-2014	From Version 26 to 27	Changed	Service and Support, Configuration Information - Factory Integrated Models and Core Options sections were updated
		Added	Sku Added on Hard Drives: • 757339-B21
		Removed	Skus deleted per missing compatibility confirmation: • E5Y43A • E5Y43AAE
29-Sep-2014	From Version 25 to 26	Changed	Pre-configured Models, Configuration Information - Factory Integrated Models sections were updated
		Added	Skus added on Core Options: • 764923-B21 • 764925-B21 • 764927-B21 • 764929-B21
		Removed	Obsolete skus removed: • 716324-B21

Summary of Changes

			• 761501-B21
18-Aug-2014	From Version 24 to 25	Changed	Models, Memory, Storage were sections updated
		Added	SKUs added on Hard Drives section: • 759212-B21 • 759210-B21 • 759208-B21
10-Jun-2014	From Version 23 to 24	Removed	Processors, Cache Memory, Networking, Hard Drives, and Storage Controllers were revised.
25-Apr-2014	From Version 22 to 23	Removed	Removed June launch SKUs.
31-Mar-2014	From Version 19 to 22	Changed	Changes made throughout.
03-Mar-2014	From Version 18 to 19	Changed	Memory was revised.
18-Feb-2014	From Version 17 to 18	Changed	Changes were made throughout.
16-Dec-2013	From Version 16 to 17	Changed	Core Options, Additional Options, Memory, and Hard Drives were revised.
11-Oct-2013	From Version 15 to 16	Added	Added Support for 6G SATA Value Endurance Boot Solid State Hard Drives
10-Sep-2013	From Version 14 to 15	Changed	Core Options, Additional Options, Memory, and Hard Drives were revised.
10-Jun-2013	From Version 13 to 14	Changed	Changes made to the following sections Standard Features - Operating System and Virtualization software support for ProLiant servers Core Options - HP Networking, updated part numbers Additions Options - HP Storage Blades
17-May-2013	From Version 12 to 13	Changed	Standard Features: Updated Memory section.
13-May-2013	From Version 11 to 12	Removed	Overview- Removed the What's New Section
		Changed	Configuration Information- Updated Step 3 Additional Options- Hp Infiniband Mezzanines, Hp Storage Blades, and HP Care Pack Services
25-Mar-2013	From Version 9 to 10	Removed	Removed the word "Platinum" throughout various sections of the document.
01-Mar-2013	From Version 8 to 9	Changed	Core Options: Added p/n 665246-B21 to HP Networking section.
21-Feb-2013	From Version 7 to 8	Changed	Changes made throughout the QuickSpec.
19-Oct-2012	From Version 6 to 7	Changed	Changes made throughout the QuickSpec.
01-Oct-2012	From Version 5 to 6	Changed	Changes made in the Networking sections.
28-Sep-2012	From Version 4 to 5	Changed	Changes made in the Options and Memory sections.
24-Sep-2012	From Version 3 to 4	Changed	Change made in Standard Features, Optional Features and Technical Specifications sections.
24-Aug-2012	From Version 2 to 3	Changed	Changes were made throughout the QuickSpec.
17-Aug-2012	From Version 1 to 2	Changed	Changes were made in Additional Options and Technical Specifications sections.

© Copyright 2015 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice.

Microsoft and Windows NT are US registered trademarks of Microsoft Corporation.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.